3. PRELIMINARY POSTEARTHQUAKE ASSESSMENT

3.1 Introduction

3.1.1 General

Following a potentially damaging earthquake, an assessment should be performed for each steel moment-frame building to determine the likelihood of significant structural damage, the implications of this damage with regard to building safety and occupancy and the need for repair. A three-step process is recommended. These steps include:

Screening. In this step, an estimate is made of the probable ground motion experienced at the building site. If this estimated ground motion falls below certain trigger values, further evaluation is not required. Section 3.2 provides recommended criteria for screening.

Preliminary Evaluation. In this step, a site visit is made to the building and the condition of the building is observed to determine if there are obvious indications of structural or nonstructural damage that pose a potential risk to life safety. The building is typically posted with a placard, based on the findings of this evaluation. Section 3.3 provides recommended criteria for preliminary evaluation.

Detailed Evaluation. In this step, detailed inspections of building framing and connections are performed to determine the condition of the structure. If structural damage is detected in the course of these inspections, further evaluations are performed to determine the significance of this damage and the appropriate repair and occupancy actions. Revision of the posting status of the building may be appropriate following such evaluation. Chapters 4 and 5 provide procedures for detailed evaluation.

As indicated in Section 1.3 and Chapter 2, following the 1994 Northridge and other recent earthquakes, structural damage was detected in many steel moment-frame buildings that had little outward signs of structural distress. Detailed postearthquake evaluations are necessary to find such damage, but involve rigorous inspection of structural condition. These more detailed evaluations can be quite costly and may be unnecessary for buildings that have not sustained significant structural damage. The initial screening process presented in this chapter is intended to provide rapid identification of those buildings that likely did not experience sufficient ground shaking to cause significant damage and which therefore need not be subjected to further evaluations. The preliminary evaluation procedures of this chapter are intended to identify those buildings that present obvious signs of severe damage so that immediate restrictions on occupancy may be placed. Following preliminary evaluation, a report of pertinent findings should be made to the Owner. If the evaluation was ordered by the Building Official, these findings should also be reported to the Building Department and the building should be posted with an appropriate placard in accordance with Section 3.3.

> *Commentary: Screening is intended to identify those buildings that experienced sufficient ground shaking that they may have sustained significant damage. If a building is not identified as likely to have experienced such ground shaking, no*

evaluation need be performed. However, if a building is identified as having experienced such ground motion both a preliminary and detailed evaluation should be performed. The preliminary evaluation is intended to provide a rapid basis for making recommendations regarding immediate postearthquake occupancy. Detailed evaluations, in accordance with Chapters 4 and 5 are used to confirm the extent and severity of any damage present and to serve as the basis for repair programs, should these be necessary.

The procedures contained in this chapter and in Chapters 4 and 5 are specifically intended to identify if earthquake ground shaking has damaged a building and thereby, impaired its safety. These procedures are not intended to determine if a building had adequate structural characteristics prior to the onset of damage or how the structure may perform in future earthquakes. Some owners may wish to assess the likely performance of their building when subjected to a future earthquake, irrespective of any damage that has occurred in the present event. Readers are referred to the companion publication, FEMA-351 – Recommended Seismic Evaluation and Upgrade Criteria for Existing Welded Steel Moment-Frame Buildings for performance evaluation and upgrade recommendations for such structures. It is recommended that such performance evaluations be performed when a building has sustained substantial damage as a result of ground shaking that is significantly less intense than the shaking specified by the current building code for design of a new structure at that site.

3.1.2 Evaluator Qualifications

Postearthquake evaluations entail the observation of different conditions within a building, making judgments as to whether they are indicative of structural damage and the likely effect of such damage with regard to the ability of the structure to withstand additional loading. This requires the application of considerable structural engineering knowledge and judgment. In order to perform these tasks properly, the evaluator should possess at least the same levels of knowledge, experience and training necessary to act as the design professional of record for the structure, and in some cases, more detailed knowledge, experience and training may be necessary. Persons possessing such knowledge, experience and training are referred to in these *Recommended Criteria* as the structural engineer. References to the structural engineer throughout these *Recommended Criteria* indicate that the work is to be performed either directly by persons possessing these qualifications, or by persons acting under the direct supervision of such a person.

3.2 Screening

Prior to performing preliminary or detailed postearthquake evaluations, it is recommended that screening be performed to determine if a building has likely experienced ground shaking of sufficient intensity to cause significant damage. Buildings need to be subjected to evaluations only if any of the following apply:

- estimated ground-motion acceleration or intensity (MMI) at the site exceeds the limits indicated in Table 3-1;
- significant structural damage is observed in one or more steel moment-frame structures located within 1 kilometer of the building on sites with similar or more firm soil profiles;
- significant structural damage is observed to one or more modern, apparently well-designed structures (of any structural system) within 1 kilometer of the building and on sites with similar or more firm soil profiles;
- damage to the general building stock within 1 kilometer of the building and on sites with similar or more firm soil profiles corresponds with the categories indicated in Table 3-1;
- for an earthquake having a magnitude of 6.5 or greater, the structure is either within 5 kilometers of the trace of a surface rupture or within 5 kilometers of the ruptured area of the fault plane when no surface rupture has occurred;
- significant architectural or structural damage is observed in the building; or
- entry to the building has been limited by the building official because of earthquake damage, regardless of the type or nature of the damage.

Table 3-1 Ground Motion Indicators of Potential Damage

1997 NEHRP MCE Map* Short-Period Contour Area	Estimated Peak Ground Acceleration	Level of Damage to Buildings Within 1 Kilometer	Estimated Modified Mercali Intensity, MMI
$S_S \geq 0.50$	$\geq$ 0.25g	Prevalent partial collapse of unreinforced masonry buildings. High levels of nonstructural damage. Considerable damage to ordinary buildings.	VIII
$0 < S_S < 0.50$	$\geq$ 0.15g	Considerable damage to unreinforced masonry buildings. Slight damage to well-designed buildings. Prevalent nonstructural damage.	VII

* *FEMA-302*, ASCE (1998) and *IBC* (ICC, 2000) maps.

If none of the above conditions apply to a building, it may be classed as unlikely to have experienced significant damage and need not be subjected to evaluation.

Commentary: Preliminary screening is typically performed by the Building Official in order to identify those areas of a community in which post earthquake evaluations should be performed. The screening criteria presented in this section can typically be applied on a regional basis, after preliminary reconnaissance has been performed to determine the general patterns and distribution of damage that has occurred in the affected region. Building departments will typically perform such surveys in the hours immediately following an earthquake, in coordination with emergency response agencies in order to coordinate emergency response

activities. The data obtained from such surveys can be used to develop preliminary isoseismal maps (maps with contours indicating probable intensities of ground shaking). These isoseismal maps can then be used to identify geographic areas, within which evaluations should be performed or ordered.

Typically, initial determination of the distribution of ground motion intensity from an earthquake and the geographic areas in which building evaluations should be performed will be subject to revision, over time, as more detailed data becomes available. A number of techniques and sources of information are available for developing these more accurate estimates of ground motion intensity. Frequently, the United States Geologic Survey (USGS) or other government agencies will develop maps of ground motion intensity, shortly after an earthquake occurs. In regions with a large number of strong-motion accelerographs present, actual ground motion recordings provide the best method of mapping contours of ground motion. These should be used if located near the building, and are located on sites having similar characteristics.

In other regions, empirical techniques, such as the use of standard ground-motion attenuation relationships (e.g., Boore and Joyner, 1994; Campbell and Bozorgnia, 1994) may be required. These can be supplemented with analytically derived estimates such as those obtained by direct simulation of the fault rupture and ground wave propagation. It may be desirable to retain a qualified geotechnical engineer or earth science consultant to make these estimates. It should be noted, however, that lacking direct instrumental evidence, site-specific ground motion estimates are, at best, uncertain and subject to wide variations depending on the assumptions made. Therefore, the best indicator of the severity of ground motion at a site is often the performance of adjacent construction. The criteria of Table 3-1 are provided to help assure that sites that experienced relatively strong ground motion are not overlooked as a result of inaccurate estimates of the ground motion severity.

3.3 Preliminary Evaluation

3.3.1 General

The objective of preliminary evaluation is to determine, on a rapid, preliminary basis, whether a building has sustained either structural or nonstructural damage that results in a hazardous condition. Preliminary evaluation includes:

- a general review of the building's construction characteristics to determine its structural system and vulnerable features (Section 3.3.2),
- a visit to the building site to observe its overall condition and note obvious signs of damage (Section 3.3.3),
- a determination of an appropriate posting category for the building, on the basis of the preceding results and engineering judgment (Section 3.3.4).

The condition ratings presented in Table 3-2 are recommended as posting categories. Section 3.3.4 provides recommended criteria for assignment of a building to the various posting categories.

Table 3-2 Postearthquake Condition Designations

Condition		Finding	Description
GREEN	1	Inspected	The building does not appear to have experienced significant damage either to structural or nonstructural components. Occupancy may continue, pending completion of detailed evaluations.
	2	Minor nonstructural damage	The building does not appear to have experienced significant damage to structural elements, but has experienced some damage to nonstructural components. Occupancy may continue, pending completion of detailed evaluations. Repair of nonstructural damage may be conducted at convenience.
	3	Minor damage	The building appears to have sustained limited damage to structural and nonstructural elements. Occupancy may continue, pending completion of detailed evaluations. Repair of damage may be conducted at convenience.
YELLOW	1	Damaged – nonstructural	The building does not appear to have experienced significant damage to structural elements; however, it has sustained damage to nonstructural components that pose a limited safety hazard. Occupancy of the building in areas subject to these hazards should be limited until repairs are instituted. Occupancy of other portions of the building may continue, pending completion of detailed evaluations.
	2	Damaged – structural	The building appears to have experienced significant damage to structural elements. Although it does not appear that the building is an imminent collapse risk, localized safety hazards may exist. Occupancy of the building in areas subject to these hazards should be limited until repairs or stabilization can be implemented, or a more reliable assessment of the building's condition can be made to demonstrate that hazards do not exist. Occupancy of other portions of the building may continue, pending completion of detailed evaluations.
RED	1	Unsafe – repairable	The building appears to have sustained significant damage to structural elements that has substantially impaired its ability to resist additional loading or to nonstructural elements that pose a significant hazard to occupants. It should not be occupied until repair or stabilization work has been performed or a more detailed evaluation of its condition can be made to demonstrate that hazards do not exist.
	2	Unsafe	The building appears to have sustained significant damage to structural elements, substantially impairing its ability to resist additional loading. It appears to be a potential collapse hazard and should not be occupied.

Commentary: The condition assessment categories indicated in Table 3-1 should be assigned on the basis of the preliminary(rapid) evaluation. However, the assignment should be subject to change on the basis of detailed evaluations conducted in accordance with Chapters 4 and 5.

It is not uncommon during the postearthquake evaluation process to discover that although a building has relatively little damage, it has severe structural deficiencies relative to current building code requirements and may as a result be

structurally unsafe. The condition assessments indicated in Table 3-2 are intended to be applied only to those conditions resulting from earthquake damage and should not be used to rate a building that is otherwise structurally deficient. However, when such deficiencies are identified in a building during the course of a postearthquake evaluation, the engineer should notify the Owner and Building Official of these conditions.

3.3.2 Building Construction Characteristics

In order to make a meaningful assessment of a building's postearthquake condition it is necessary to develop an understanding of its structural system and basic details of the building's construction and to clearly establish the seismic load path. Whenever the structural and architectural drawings for the building are available, they should be reviewed as part of the preliminary evaluation. The review should include the following:

- confirmation that the building is a steel moment-frame structure,
- determination of the year of design and construction and code used as a basis; this may provide information on particular vulnerabilities, such as the presence of weak stories, or use of particular weld metals,
- identification of materials and typical details of connections and elements for areas of particular vulnerability,
- identification of the location of steel moment frames,
- identification of locations of moment-resisting beam-column connections and column splices, to identify locations where potentially vulnerable conditions exist,
- identification of any structural irregularities in the vertical and horizontal load resisting systems, that could lead to potential concentrations of damage, and
- identification of architectural elements that could affect the behavior of the structural system or elements, or that may themselves be vulnerable to damage and be a threat to occupants, including, for example, precast concrete cladding systems and interior shaft walls.

3.3.3 Preliminary Site Inspection

Every steel moment-frame building situated on a site that has experienced strong ground shaking, as identified in accordance with the screening criteria of Section 3.2, should be subjected to a rapid postearthquake inspection to ascertain whether there is apparent damage and to determine the apparent severity of such damage. When performing the inspection, the structural engineer should attempt to determine if strong motion accelerometers are present in the building. If so, the record should be accessed and reviewed for noticeable changes in behavior during the building response that may be indicative of significant structural damage.

Preliminary site inspections should include the following:

1. Visual observation of the building exterior. Check for:

- ☑ obvious indications of large permanent interstory drift,
- ☑ indications of foundation settlement or distress as evidenced by sags in horizontal building fenestration or distress in base level slabs,
- ☑ loosened or damaged cladding or glazing systems,
- ☑ indications of discrete areas of the building where interstory drift demands may have concentrated as evidenced by apparent concentrations of architectural damage to fascia and cladding systems,
- ☑ pounding against adjacent buildings or portions of the building separated by expansion joints, and
- ☑ potential site instabilities such as landslides or lateral spreading that may have resulted in damage to the building foundations or structure.

2. Visual observation of the building interior. Check for:

   - ☑ damage to nonstructural components, such as suspended ceilings, light fixtures, ducting, and masonry partitions, that could result in potential hazards,
   - ☑ damage to floor slabs around columns, to finishes, and to partitions, that may suggest damage to adjacent beams and connections,
   - ☑ indications of discrete areas of the building where interstory drift demands may have concentrated as evidenced by apparent concentrations of damage to architectural elements including interior partitions,
   - ☑ damage to interior finishes on structural elements, such as columns, that could be indicative of damage to the underlying structure,
   - ☑ damage to equipment or containers containing potentially hazardous substances, and
   - ☑ damage to elevator counterweight and rail systems.

3. Evaluation of the building for permanent interstory drift.

   Preliminary evaluation of the building for permanent interstory drift should be performed. This can be done by dropping a plumb bob through the elevator shaft and determining any offset between threshold plates in adjoining levels of the building. Multiple levels should be checked simultaneously, to minimize the effect of minor offsets resulting from within-tolerance variations in the original construction.

4. Perform preliminary visual inspection of selected moment frames for indications of damage. Refer to Sections 3.3.3.1 and 3.3.3.2 for preliminary inspection procedures for moment-resisting connections with and without fireproofing present, respectively.

   - ☑ If visual observation of building exterior or interior indicates a zone or zones of large permanent interstory drift, perform selective removal of architectural finishes to expose framing. Observe for indications of yielding, buckling or other damage to framing, or connections. Exposures and observation should be made of at least one beam-column connection per line of framing per story within the zone or zones of large permanent

interstory drift. For highly redundant structures, with many lines of framing, exposures and observations may be limited to one beam-column connection on one line of framing in each direction of building response, on each side of the structure, with a minimum of two exposures per story.

☑ If visual observation of building exterior or interior indicates zones of concentrated interstory drift demand, perform selective removal of architectural finishes to expose framing. Observe for indications of fracture, yielding or buckling of framing, or damage to connections. Exposures and observation should be made of at least one beam-column connection per line of framing per story within the zone or zones of concentrated interstory drift demand. For highly redundant structures, with many lines of framing, exposures and observations may be limited to one beam-column connection on one line of framing in each direction of building response, on each side of the structure, with a minimum of four exposures per story.

☑ If visual observation of building exterior or interior indicates neither zones of large permanent interstory drift, nor of concentrated interstory drift demand, perform selective removal of architectural finishes to expose framing throughout structure. Observe for indications of yielding or buckling of framing, or damage to connections. Exposures and observation should be made of at least one beam-column connection per line of framing per story. For highly redundant structures, with many lines of framing per story, exposures and observations may be limited to one beam-column connection on one line of framing in each direction of building response, on each side of the structure, with a minimum of two exposures per story.

☑ If visual observation of the building exterior indicates zones of pounding against adjacent structures, expose framing in the area of pounding to identify damage to structural elements and connections.

Commentary: In most steel moment-frame buildings, structural steel will be obscured by fire protective coverings that are frequently difficult to remove. In many cases these coverings will be composed of asbestos-containing materials, if constructed before 1976, and must not be removed by anyone without proper training. Observation conducted as part of preliminary procedures is limited to observing the condition of the steel, if exposed to view, or the condition of the fire protective covering if the steel is not exposed, to observe tell-tale signs of structural damage including cracking or spalling of the covering material, or loosened and broken bolts.

The presence of one or more strong-motion instruments in a building can provide valuable evidence as to the extent of damage a building has experienced. Noticeable lengthening of the building period can be an indication of structural damage. However, even in the absence of instruments within a building, it may be possible to obtain indirect evidence of changes in a building's dynamic properties that are indicative of damage. This could include apparent lengthening of the building period, or increasing nonstructural damage in aftershocks.

3.3.3.1 Preliminary Connection Inspections when Fireproofing is Present

Perform the observations indicated in the checklist below. Figure 3-1 indicates the various zones of observation. Note that fireproofing need not be removed as part of the preliminary inspection, unless indications of potential damage are noted, at which point fireproofing should be removed to allow confirmation of the extent of any damage. If there is reason to believe the fireproofing is an asbestos-containing material, removal should be performed by appropriately trained personnel with proper personnel protection. The engineer should not personally attempt to remove fireproofing suspected of being an asbestos containing material unless he has been trained in the appropriate hazardous materials handling procedures and is wearing appropriate protective equipment.

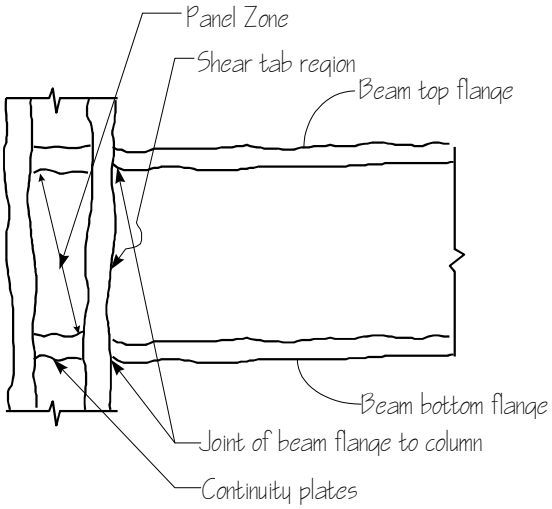

Figure 3-1 Observation Zones for Fire-Proofed Beam-Column Connections

- ☑ Observe beam framing into connection for trueness to line, and potential indications of lateral flexural-torsion buckling (damage type G8, Section 2.2.1).
- ☑ Observe condition of fireproofing along beam within one beam depth of the column for cracking or spalling of the fireproofing material along the beam surface, indicating potential yielding or buckling of the beam flanges (damage types G1 and G2, Section 2.2.2).
- ☑ Observe the top and bottom surface of the bottom flange fireproofing and bottom surface of the top flange fireproofing at the locations where the beam flanges join the column flanges (or continuity plates for minor axis connections) for cracks or losses of material that could indicate cracking at the full penetration weld (damage types G3, Section 2.2.1; C1, C3 and C4, Section 2.2.2; W2, W3, W4, Section 2.2.3).
- ☑ Observe the condition of the fireproofing at the beam web, in the vicinity of the clip connection from the beam web to the column for loosened, cracked or spalled material indicative of potential damage to shear tabs (damage types S1 through S5, Section 2.2.4).
- ☑ Observe the condition of the fireproofing at the column panel zone for cracks, loosened or spalled material, indicative of damage to the panel zone or continuity plates (damage types P1 through P8, Section 2.2.5).

- ☑ Observe the flanges of the column at and beneath the joint with the beam flange for loosened, spalled or cracked material, indicative of fractures, buckled or yielded sections (damage types C1, C3, C4, C6, Section 2.2.6).
- ☑ Observe the column flange in the area immediately above the bottom beam flange for loosened, spalled or cracked material, indicative of a potential divot type fracture of the column material (damage type C2, Section 2.2.2).

Commentary: The presence of fireproofing will tend to obscure many types of damage, unless the damage is very severe. However, removal of fireproofing can be a difficult and time consuming process. For the purposes of preliminary inspection in buildings with fireproofing, inspection is limited to that readily observable with the fire proofing in place. Removal of fireproofing and more careful visual inspection in such buildings is limited to inspections performed as part of detailed evaluations, in accordance with Chapters 4 and 5 of this publication. An exception is the case when observation indicates that the fireproofing has noticeably cracked, spalled or loosened, indicating that damage has probably occurred to the steel framing beneath. In this case, removal of fireproofing is recommended as part of the preliminary inspection to determine the extent of damage.

In many buildings constructed prior to 1976, the original fireproofing materials commonly contained friable asbestos fibers. Disturbing such material without wearing suitable breathing apparatus can result in a significant health hazard both to the person performing the work and also to others located in the area. For this reason, owners have been gradually addressing these hazards either by encapsulating such fireproofing, to prevent it from being disturbed, or replacing it with non-hazardous materials. In buildings constructed prior to 1976, the engineer should not permit fireproofing to be removed except by properly trained personnel using appropriate procedures unless the owner can present suitable evidence that the material does not contain friable asbestos.

3.3.3.2 Bare Structural Steel

Preliminary inspection of framing connections in buildings that do not have fireproofing in place on the structural steel should include the complete joint penetration (CJP) groove welds connecting both top and bottom beam flanges to the column flange, the backing bars and the weld access holes in the beam web; the shear tab connection, including the bolts, supplemental welds and beam web; the column web panel zone, including doubler plates; and continuity plates and continuity plate welds (see Figure 3-2).

The inspection should be by visible means. Observe all exposed surfaces for cracks, buckling, yielding, and loosened or broken bolts. The area inspected should include that portion of the beam within a distance d_b (beam depth) of the face of the column, that portion of the column below the connection and within a distance d_c (column depth) of the bottom beam flange, the panel zone and all bolts and plates within these regions. Sections 2.2.1 through 2.2.6 indicate

the types of damage that may be present. All damage observed should be recorded according to the classification indicated in those sections, and documented in sketch form.

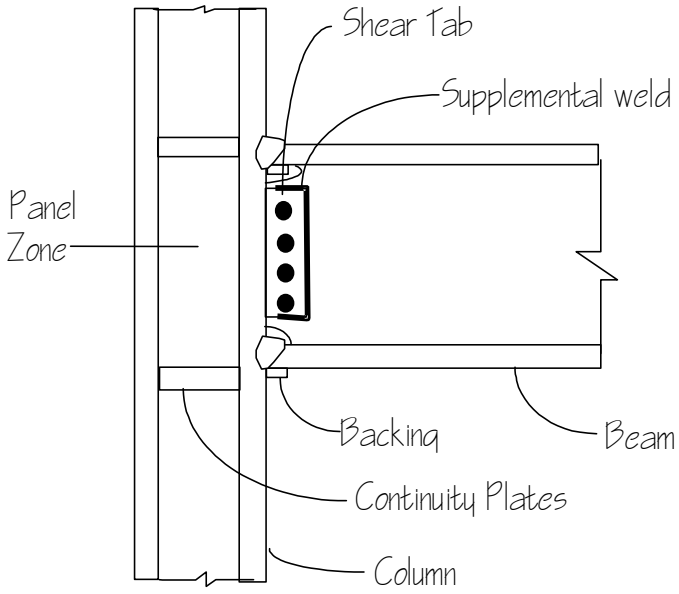

Figure 3-2 Components of Moment Connection

Note that visual inspection should not be performed casually. After a fracture forms in steel framing, it can close up again under further loading of the building. Such "closed" fractures, though obscure, can typically be detected by careful observation, sometimes aided with touch to detect roughness in the surface in the vicinity of a potential fracture. Wetting of the area of a suspected surface crack can also assist in detection. In some cases, it may be necessary to use more formal nondestructive testing methods, such as ultrasonic testing, magnetic particle testing, or liquid dye penetrant testing to confirm the presence of such cracks. Such confirmation can be performed as part of the more detailed inspections undertaken as part of a Level 1 detailed evaluation (Chapter 4) or a Level 2 detailed evaluation (Chapter 5).

Certain types of damage (C2, C3, C5, Section 2.2.2; W2, W3, Section 2.2.3) may be impossible to detect by visual observation alone, as the presence of weld backing at the underside of the beam flange will obscure the presence of the fracture. The presence of a gap between the bottom edge of the backing and the column flange is one indication of the potential presence of such damage. If such a gap is present it may be possible to explore the presence of concealed fractures by inserting a feeler gauge into the gap to determine its depth. If the feeler gauge can be inserted to a depth that exceeds the weld backing thickness, a fracture should be assumed to be present. Nondestructive testing will be required to confirm the extent of such damage, and can be performed as part of the more detailed evaluation. Alternatively, the backing can be removed to allow direct observation of any damage present. However, such removal entails either cutting or grinding operations and can not normally be performed as part of a preliminary evaluation.

3.3.4 Data Reduction and Assessment

Following the collection of data on a building, as outlined in Sections 3.3.1 and 3.3.2, it is necessary to form a preliminary opinion as to whether a building has sustained damage that creates a potential hazard, and the severity and distribution of such hazards, if present. The following sections provide recommendations in this regard. The structural engineer, on the basis of the evaluated data, or personal engineering judgment, may make a more conservative assessment.

3.3.4.1 Finding of Dangerous Condition

An assessment should be made that a building has been extensively damaged and is potentially hazardous, if any of the following conditions are observed:

- permanent interstory drift in any level of 1.0% or greater,
- unexpected severe damage to architectural elements or significant period lengthening of the building is observed in aftershocks,
- visual inspections of steel framing indicate the presence of two or more fractures of the type G7, C3, C6, C7, S3, S4, S5, S6, P6, P7 or P9, at any floor level, or
- the building experiences excessive lateral deformation or unusual amounts of additional architectural damage in moderate aftershocks.

In the event that any of the above conditions is detected, the building should be assessed on a preliminary basis as conforming to damage condition Red-1, of Table 3-2. A detailed evaluation should be recommended and notification should be made advising against continued occupancy until a more detailed determination of structural condition can be completed.

> *Commentary: The observed behavior of a building in repeated aftershocks may provide some clues as to whether it has experienced significant structural damage. In instrumented buildings it may be possible to observe a lengthening of the building period during aftershocks. In buildings without instruments, the observation of unexpected large amounts of architectural damage during aftershocks could indicate the presence of previous structural damage.*

3.3.4.2 Finding of Damaged Condition

If none of the conditions indicated in Section 3.3.4.1 are determined to exist, but one or more of the conditions indicated below are present, an assessment should be made that the building has sustained significant nonstructural damage and should be posted as damage condition Yellow-1 of Table 3-2. Appropriate precautions should be taken to limit access to hazardous areas.

- Connections of exterior fascia panels have been damaged and panels are hanging loosely on the building.
- Exterior glazing is broken above the first story.
- Connections of stair stringers to floor framing has been compromised.

- Ceiling components, including suspension systems, lights, HVAC and utilities have been damaged and are hanging into the occupied spaces or walkways.
- Gas lines are damaged or containers of unidentified or known hazardous materials have toppled and spilled.
- Egress ways are blocked or inoperable.
- Emergency lighting systems are unusable.
- Fire suppression systems required by code are inoperable.

If none of the conditions indicated in Section 3.3.4.1 are determined to exist, but one or more of the conditions indicated below are present, an assessment should be made that the building has sustained significant structural damage and should be posted as damage condition Yellow-2 of Table 3-2. Appropriate precautions should be taken to limit access to hazardous areas.

- Visual inspection of steel framing indicates shear tab damage type S3, S5 or S6 in any beam connection, in accordance with Section 2.2.4.
- Visual inspection of steel framing indicates that a beam has become dislodged from a supporting member or element.
- Visual inspection of steel framing indicates that a column has experienced type P7 damage in accordance with Section 2.2.5, or type C7 damage in accordance with Section 2.2.2.

3.3.4.3 Finding of Undamaged Condition

If none of the conditions indicated in Sections 3.3.4.1 or 3.3.4.2 are determined to exist, it is recommended that the building be assessed Green-1, Green-2, or Green-3 of Table 3-2, as appropriate, pending completion of detailed evaluations in accordance with Chapter 4 or 5.

> *Commentary: The absence of significant observable damage to steel moment-frame structures in a preliminary evaluation on sites believed to have experienced strong ground motion, per Table 3-1, should not be used as an indication that detailed evaluations are not required. Many steel moment-frame buildings that were structurally damaged by the 1994 Northridge and 1989 Loma Prieta earthquakes had little apparent damage based on casual observation.*

3.3.5 Reporting and Notification

Following performance of a preliminary evaluation, notification should be made that an evaluation has been performed and a report should be provided to the Owner. The extent of notification to be made is dependent upon the jurisdiction of the party performing the evaluation, and upon the condition of the building. If the building has been found to be dangerous, the occupants ultimately must be notified (in a timely manner).

3.3.5.1 Building Departments

When preliminary evaluations are performed by or on behalf of the Building Official, or other authority having jurisdiction, the following notifications should be made:

- A placard should be placed at the main entry to the building indicating that a preliminary (rapid) evaluation has been performed, and indicating the assessed condition designation of the building, recommended occupancy restrictions, follow-up actions, and the identity and affiliation of the person performing the evaluation. In large buildings with more than one entrance, additional placards should be placed at all other entrances (ATC, 1989). Appendix B to these *Recommended Criteria* includes sample placards (from ATC, 1995).
- If a building has been posted either as "damaged" (condition Yellow-1 or Yellow-2) or "unsafe" (condition Red-1 or Red-2), additional written notification should be served on the Owner at his/her legal address, indicating the status of the posting, the Owner's rights and any actions required on the Owner's part.

3.3.5.2 Private Consultants

If postearthquake evaluations by private consultants are permitted by the local authority having jurisdiction, the same procedures prescribed in Section 3.3.5.1 should be followed: a placard should be placed at the main entry to the building indicating that preliminary evaluation has been performed, the assessed condition of the building, recommended occupancy restrictions and follow-up actions, and the identity and affiliation of the person performing the evaluation. In large buildings with more than one entrance, additional placards should be placed at all other entrances (ATC, 1989). Appendix B to these *Recommended Criteria* includes sample placards (from ATC, 1995).

In addition, a formal report should be prepared indicating the scope of evaluation that has been performed, the findings of the evaluation, including a description of any damage encountered, the appropriate postearthquake condition designation assigned to the building and any recommendations for additional evaluation, restrictions of occupancy and/or repair action. The report should be submitted to the party requesting the evaluation and to other parties as required by law.